

# **METALLIC FRAME STRUCTURE FOR WIDE OPENING SLIDING CLOSURE**

## **RELATED U.S. APPLICATIONS**

Not applicable.

## **STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

Not applicable.

## **REFERENCE TO MICROFICHE APPENDIX**

Not applicable.

## **FIELD OF THE INVENTION**

[0001] The present invention refers to a metallic frame structure for wide opening sliding closures, with a vertical opening, the profile of which is of reduced overall visual dimensions.

## **BACKGROUND OF THE INVENTION**

[0002] Closures are known, both in the case of internal partitions of buildings and in the case of openings made along the walls that delimit the building, that consist of entrance or through doors and windows for airing and lighting the surroundings. In the case of secondary entrances and accesses to terraces and private uncovered areas, the designers often resort to large glazed type openings that are constructed by means of openings where at least one of the doors, through a lifting mechanism, is to be raised from its resting position, to slide sideways on guides, thus allowing the passage of people and objects.

[0003] Conventionally, however, the said openings have one or more longitudinally mobile doors,

that when in the rest position, for example closed, are raised from the respective seat by means of a mechanism operated through the rotation of a handle with a lever arm or rather developed lever arm, to then be provided with wheels along the inferior side to connect correspondingly to tracks, sliding freely to and fro until reaching the desired position. In this way the sliding doors, in one case line themselves up to the static part of the closure and in a second case are concealed on the inside of a compartment built into in the perimeter wall.

**[0004]** At present, the ordinary availability of mechanisms on the market for the opening of closures with vertical sliders involves dimensions and visual volumes with prefixed minimums. Said mechanisms at the most are designed for wooden closures with average size openings and loads of modest entity.

**[0005]** A traditional closure solution, destined to allow the support of greater loads with respect to the usual loads, is described for example in US5742979 (Garcia-Hernando). In more detail, the proposal being considered includes an upper profile, subdivided into two parallel rails, each of which essentially resemble an overturned U-shaped profile. On the interior of each rail, the upper end of a panel moves that includes, along the upper border, a profile that forms part of the support frame. In terms of the lower part, the two panels are attached by means of a connector rod out of alignment with a couple of sliding wheels. Said wheels are contained on the inside of one of two longitudinal seats with a box-like profile, on the base of which the respective tracks in a longitudinal form are provided.

**[0006]** Modern constructions, on the other hand, require increasingly safer closures with notable dimensions and overall visual frame volume being reduced to a minimum, this in addition to minimalist aesthetic issues, with the obvious intention of enjoying natural light as much as possible.

These closures often house glass that is increasingly thicker and resistant to numerous cycles of use, without also taking into account that it must be burglar-resistant and must guarantee at least a good level of water and air tightness.

**[0007] PRIOR ART**

**[0008]** In response to the problems previously mentioned, the companies in this sector have attempted to overcome the problems mentioned, firstly by using new materials for the construction of the closure frame, making it substantially safer and more resistant. From these materials, steel has been identified as the material with the combination of characteristics that completely fulfill the criteria.

**[0009]** Firstly, due to the shaping of the steel or partly steel closure, usually destined for other uses and in most cases not with transparent covering sheets, structures with suspension sliding doors are being considered. These have the advantage of not requiring the predisposition of ground guiding means, thus allowing free transit through the opening without any kind of obstacle. This is the case for FR275233 (Omer), where each panel, by means of a rod support device with a corresponding sliding carriage, is supported by a longitudinal guide profile, attached in correspondence to the upper side of the opening. Also DE19817440 25 (Dais), describes a system of sliding doors with steel components, of the suspension type. In this case, contrary to the previous case, there is a lower profile along which the lower ends of each suspended panel slide whilst being guided.

**[0010]** Also EP0551961 (Wacker), deals with the field of suspension sliding doors with steel components. This requires, as for the previous cases, the fixing to the back of the external facade of the opening, along the upper edge, of a metal profile, essentially in a "C" shape which, along the base side, is equipped with a longitudinal rail. On said track there is at least one sliding wheel, fitted to

an arm that on its lower part supports the frame of the closure. The lower part of the sliding door is close to the floor and is separated from the latter by the interposition of a watertight seal attached along the lower profile of the door. In this hypothesis, the door, always on the lower part, slides along the back of an anterior metal profile, against which the edge of the panel can make contact. Said anterior metal profile has a side perpendicular to the ground which the lower part of the panel rests on, while on the opposite side there is an inclined side, longitudinally ribbed by means of a reinforcing perpendicular strip, that being inside the profile is not visible.

#### **[0011] STATE OF THE ART**

**[0012]** DE19849518 (Witzel), describes a closure of the parallel sliding type whose transparent glass support frame comprises on the lower part of a first base profile in aluminum, to which a box section steel profile is adhered, then adhered to a metal profile with an " L" section that incorporates the sliding track. Above said first base profile a second metal profile slides parallel and supports, in a suitable housing, the covering sheet whose second profile is in turn adhered to a second steel box section profile. The latter, is equipped on the interface facing towards the exterior with an aluminum frame that projects with respect to the closure profile, it contains the sliding mechanism that consists of the set of sliding wheels. In still more detail, the sliding mechanism is fixed in correspondence to the interface facing towards the exterior of the second box section steel profile, adhered to the lower profile of the chassis that includes the lower part of the covering sheet. In terms of the shaping of the chassis that serves the purpose of housing the sliding mechanism, it comprises of the substantially inclined upper side followed by a vertical wall that extends toward the floor, remaining separated.

**[0013]** Other known solutions include steel tubes, constructed for containing guides and

mechanisms, for the opening and movement of the closure to guarantee burglar protection and the possibility of housing glass even of considerable thickness. However, such frames must have pre-established dimensions in terms of housing of the closing and movement mechanisms normally available on the market. The tubes used at present consist of an almost rectangular zone suitable for housing the mechanisms and closings for the closure construction, while along the upper side which supports the lower edge of said pane, a rebate fin that serves to hold the pane is also provided. On the other hand, instead, on the back of the pane the spline is fixed, normally under pressure, by means of screws.

#### **[0014] DRAWBACKS**

**[0015]** The above-mentioned solutions are certainly significant, however it is the opinion of the applicant that there may still be some limitations.

**[0016]** For example, in the conventional proposals for closures of the type that slide along a track placed at floor level, as described in US5742979 (Garcia-Hernando), steel is not used and furthermore the proposals see the sliding system in axis with the covering sheet or panel located on top. Therefore, they are not burglar-resistant and do not allow the rational exploitation of the frame as it presents a rather important visual obstacle.

**[0017]** In the proposals for closures where, on the contrary, there are certain steel components such as FR275233 (Omer) or DE19817440 (Dais), each door is in suspension, since the load that they can support is somewhat modest with certain obvious limitations in terms of usable thicknesses of glass. Furthermore, these require rather complex structures that are not aesthetically pleasing as the system of suspension remains particularly obvious. With reference to EP0551961 (Wacker), it is possible to affirm that it presents substantially the same drawbacks and furthermore the anterior part of the

profile that shows the inclined side has the sole aesthetic function of reducing the angular shape of the profile.

**[0018]** In relation to the other known solutions that envisage simple steel tubes, constructed for containing guides and sliding mechanisms, it is to be noted that the drawbacks are predominantly related to aesthetic character. The request for certain measurements for the housing of the closing and movement mechanisms comprises certain pre-established minimums for steel tubes with buffer and pressure spline. Therefore, visual volumes are connected without any possibility of their limitation and thus reduce previously mentioned dimensions. Finally, the position of the cylinder for the lock and handle are standardized and may not be positioned any differently to that which is pre-established.

**[0019]** With reference to DE19849518 (Witzel), the closure has excessive dimensions that are particularly complex and difficult to construct, above all in terms of the longitudinal connection of sections of different material. In addition there is the fact that the visual dimension of the frame is even more important than the conventional aspects, verifiable in the doors that have the steel tubular profile containing the guides and sliding mechanisms.

**[0020]** Here the need exists to determine certain improvement solutions with respect to the prior art.

**[0021]** The aim of this invention is also to avoid the above-mentioned drawbacks.

#### BRIEF SUMMARY OF THE INVENTION

**[0022]** This and other aims are achieved with the present invention according to the characteristics in the included claims, by means of a steel frame structure for wide opening sliding closures, with a vertical opening, of the type of door with covering panel/sheet that is out of alignment with regards

to the closing and movement means, in which, at least the lower tubular profile, internally, forms an area that contains the carriages, positioned in the external side of the closure, with an opposite and adjacent area that has the sideways extension of the profile with a projecting surface with respect to said sliding means, said surface being provided, along the upper side, with a glass buffer edge and with a base in correspondence with which the spline connects; and furthermore in which said lower profile cooperates with an analogous upper guide profile that holds the corresponding and opposite edge of the glass, an upper guide profile that has a sliding block that acts against a vertical wall of the upper guide profile hinged on the opposite glass application side.

**[0023] AIMS**

**[0024]** In this way, through the considerable creative contribution, the effect of which constitutes immediate technical progress, the following aims that are all substantially destined to increase the functionality of the vertically sliding closure are achieved.

**[0025]** A first aim intends to reduce significantly the obviousness of the profile that marks out the covering glass. This was possible due to the fact that the glass is positioned substantially out of alignment with respect to the sliding means, which rest on the respective profile, slightly drawn back towards the interior environment with respect to conventional closures. In this way, the height of the profile area is to be reduced in correspondence with the anterior carriage housing seat, giving as a whole a greater brightness and visual width. DE19849518 (Witzel), besides the fact that this concerns a different closure, with the sole similarity being that it also presents the covering glass out of alignment, it requires for the support of the glass a profile of aluminum assembled with other support sections, that for its necessary structure and shape, presents a rather important visual dimension and in any case far superior dimension with respect to the solution that is the object of

this invention. In more detail, in DE19849518 (Witzel) the glass application seat itself, obliged by the shaping of the frame profile, is made with greater height with respect to the upper limit of the profile that delimits the area holding the sliding carriages. On the contrary, in the solution that is the object of this invention, the application seat of the edge of the glass, in addition to being beside the carriage holding seat is also of a lower height with respect to the upper limit of the area of the profile that delimits the said holding seat.

**[0026]** A second purpose consists in achieving a closure that in spite of having weight content, allows the maintenance of a good level of burglar-resistance, easy construction and is easily put into action. DE19849518 (Witzel), due to the fact that different profiles combine, one joining to another, it is rather heavy and requires both complex manufacturing and putting into action, given that, for example in correspondence with the lower area, three sections each made of different material must combine.

**[0027]** Finally, a third purpose intends to construct a closure for the specific purpose, not particularly complex, valuable for good technological content for the company, improving considerably the offer on the market with a control of production costs.

**[0028]** These, and other advantages will appear from the following detailed description of a preferred embodiment solution with the aid of the enclosed schematic illustrations, the details of which are not to be considered as limitative examples but merely as examples.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

**[0029]** Figure 1 represents a view in particular of the lower and upper area of the closure of the present invention.



[0030] Figure 2 is a cross sectional view of a first support profile of the covering glass for the closure in Figure 1.

[0031] Figure 3 is a cross sectional view of a variant of the support profile of the covering glass, also for the closure of Figure 1.

[0032] Figure 4 is a cross sectional view of a third variant of the support profile of the covering glass, also for the closure of Figure 1.

[0033] Figure 5 is a cross sectional view of a fourth variant of the support profile of the covering glass, for the closure of Figure 1.

[0034] Finally, Figure 6 is a cross sectional view of a fifth variant of the support profile of the covering glass, also for the closure of Figure 1.

#### DETAILED DESCRIPTION OF THE INVENTION

[0035] Also referring to the Figures, it is to be noted that closure 1 particularly for a vertically sliding door, consists of a frame that includes at least one tubular rectilinear profile 2a-2e, 2f, and is metallic, preferably steel, that provides internally a seat S. The said seat S is developed in width, in such a way, that in the case that the profile 2a-2e is introduced into the lower area of the closure 1, as in one case, to house the carriages 3 as components of closing and movement means of closure 1. In more detail, the seat S obtained longitudinally with respect to the profile 2a-2e, disposes of a first area close to the side 20 facing towards the exterior of the profile 2a-2e, which receives the carriages 3, while the adjacent area remains in an essentially empty state. In this way, the base side 22 of the profile 2a-2e, along the housing area for the carriages 3, disposes of a slight rectilinear recess in the manner of a channel, 220, which allows the groove portion 30 of the carriages 3 to project from the profile 2a-2e to be introduced in correspondence to a corresponding track 4.

**[0036]** The shape of the profile 2a-2e, the edges of which are almost all rounded, have substantially, two parallel sides, respectively one side facing towards the exterior 20, and one side facing towards the interior 21 of the environment, both essentially orthogonal with respect to the base side 22.

**[0037]** The side facing towards the exterior 20 is high enough to contain the carriages 3 and has higher ends coinciding with the base of an inclined connecting side 23. The connecting inclined side 23, in this case, is a flat surface and extends over the area that houses the carriages 3 then, projects inwards towards the interior, to have a short section in the manner of a shoulder 24 perpendicular to the following flat surface 25. The flat surface 25, constituting its external seat, is functional due to the fact that it allows the stop of the lower edge of a pane 5, held in contact against the shoulder 24 by a corresponding and opposite spline 6 of the pressure type.

**[0038]** The upper part of the closure 1, requires a guide profile 7 fixed along the upper beam that delimits the light aperture, the profile of which 7 disposes of a wall 70, perpendicular to the base side, positioned in closer correspondence to the internal facade of the closure 1. Against one of the two fronts of said wall 70 sliding block 8 is applied, hinged to a second and underlying profile 2f, perpendicular in respect to the base portion 22f. Said second profile 2f, receives the upper edge of the glass 5 and is of an almost identical section to the section of the corresponding profile 2a, which receives the lower side of the glass 5, except by shape of the guide channel 220f. In this case, the said guide channel 220f has at least some of the longitudinal seats 221, parallel, on the interior of which the couple by an oblique inclined connecting section, that joins said upper side 23d to the anterior side 20. Analogously, the same sections of one of the profiles 2a-2e, 2f can be used to constitute the lateral upright of the frame of at least one door of the closure, joining the ends of the lower profile 2a to those of the upper profile 2f, in the end bordering peripherally the edge of the glass 5.